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Terra Nova High School Outdoor Development

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This paper describes the preconstruction planning of an outdoor space at Terra Nova High School in Pacifica, Ca. The project involved the production of three separate proposals at a high, moderate, and low-cost point. Each proposal included a conceptual design, takeoff, estimate, and model renderings. To create the conceptual designs and estimates, several programs and outside sources were utilized, including Revit, Bluebeam, RS Means, and Precision Estimating Services. The end designs include varying combinations of outdoor picnic seating, site boulders, raised planter beds and a concrete stage. The resulting proposals outline the expected project costs for each design as well as, define the project exclusions and design assumptions.

Key Words: Proposal, Estimate, Design, Project, Terra Nova

Introduction

For my senior project, I wanted to utilize my Construction Management education to give back to my high school. Throughout high school, I was actively involved in student leadership and the campus community, and those experiences provided me with the tools necessary to succeed at a higher education level like Cal Poly. Because of this, I wanted to give back to the community that provided me with so much. Through collaboration with the school's administration, we discussed preconstruction planning for the development of a portion of the campus that is currently underutilized. The space consists of an existing 7000 sq. ft. stabilized DG pad located near the math and science buildings. I then worked with the school's Leadership class to narrow in on the potential uses and features of the outside space which include, outdoor seating, plantings, and a garden area. With this information, I have developed three proposals consisting of a project estimate, site layout, site furnishings list, and site renderings at three different price points. With these proposals, the school gains a better understanding of the financial commitment this project will take, as well as a conceptual design that they can develop and change to suit their future needs.

Planning & Execution

Client Meeting

Before beginning the preconstruction planning, I met with the Terra Nova Leadership class to discuss the project and explain my role in the planning process. The leadership teacher felt it was important I explain some of the key development considerations that students should keep in mind during our brainstorming session. These considerations included safety, maintenance, material longevity, and cost considerations. For all these, the main point I made is that every component of the design should consider the end-user, in this case, high school students. For instance, when one student proposed hammocks, I shifted the conversation towards safety and upkeep, emphasizing that they should consider that the hammocks may be used outside of the boundaries of their intended design leading to damage or injury.

For the brainstorming session, the students were split into groups based on grade level. From there I was able to meet with each group and discuss some of the key features that they hoped would be included in the project. After the small breakout sessions, we met as a large group to review the main design features and sort them into the three proposal categories of high, moderate, and low cost. For the high-cost proposal, we settled on covered seating, a concrete stage, a garden area, and swing benches. For the moderate-cost proposal, we decided on seating throughout, a concrete stage, a garden area, and swing benches. Lastly, for the low-cost proposal, we discussed general seating, plantings, and a garden area, excluding the more expensive concrete stage and swing benches.

Design, Takeoff & Estimating

The designs were created using Revit and Bluebeam. The design development began by filling the space with the specified site furnishings and then ensuring that each design element from the client meeting was captured. Once the designs were established, a material takeoff was conducted to get the necessary quantities needed for the estimating process. The takeoff was completed in Bluebeam using line-item templates established by Precision Estimating Services. Once the takeoff was complete, the estimating process began.

The first step in the estimating process was inputting the project quantities into the estimating template that was provided by Precision Estimating Services. Once the data was imported and extrapolated to capture all the necessary components involved in the project's construction, cost data was sourced from RS Means Online. Using the many features already established in the template, the RS means data was allocated to the corresponding line-item quantities. Once all the costs were also captured, final mark-ups and contingency costs were added, including money allocated for project escalation. In this case, 4 years was assumed.

Deliverables

For the Terra Nova Outdoor Development project, three proposals were created. Each proposal includes a project estimate, a plan sheet showing all furnishings, a project takeoff, renderings, and a site furnishings price sheet. Additionally, a basis of cost and design summary was included, breaking down the project exclusions, assumptions, and disclaimers. With these proposals, Terra Nova High

School can move forward with project planning and determine if they have the necessary funding to complete one of the proposed designs.

High-Cost Proposal

The high-cost proposal includes a shade sail structure, concrete stage, extensive seating, and plantings throughout. The main project features driving the cost of construction in this proposal are the concrete stage and shade sail structure. The concrete stage accounts for nearly 22% of the direct costs of the project and the shade sail is approximately 26% of the total direct costs.

High-cost Proposal Material Takeoff

Line-item Description	Quantity
Concrete SOG, 6”, #3 rebar e.w.	1,375 SF
Continuous footing, 1’x1’ with 1.5’x8” stemwall	145 LF
Site boulder, 36”x36”x36”	4 EA
Native grasses	10 EA
Backless concrete bench, 6’	8 EA
Modular garden bed	4 EA
Picnic table, 8’	12 EA
Bench Swing	3 EA
Shade sail structure	715 SF
Tree	3 EA

Moderate-Cost Proposal

The moderate-cost proposal includes a concrete stage, extensive seating, and plantings throughout. The main project feature driving the cost of construction in this proposal is the concrete stage that accounts for 19% of the direct costs. Additionally, there is substantial funding allocated to site furnishings, but this is not considered a cost driver because they are the foundational elements of the project featured in each of the designs, however, is it important to note that site furnishings account for 68% of the project cost.

Moderate-cost Proposal Material Takeoff

Line-item Description	Quantity
Concrete SOG, 6”, #3 rebar e.w.	1,245 SF
Continuous footing, 1’x1’ with 1.5’x8” stemwall	150 LF
Site boulder, 36”x36”x36”	4 EA
Native grasses	71 EA
Backless concrete bench, 6’	15 EA
Modular garden bed	4 EA
Picnic table, 8’	10 EA
Bench Swing	3 EA
Tree	1 EA

Low-Cost Proposal

The low-cost proposal excludes many of the driving cost features from the other two designs. The low-cost proposal includes picnic table seating, a garden area, and trees throughout. The main cost factors for this design are the trees. This single line item accounts for nearly 16% of the total direct costs.

Low-cost Proposal Material Takeoff

Line-item Description	Quantity
Backless concrete bench, 6’	12 EA
Modular garden bed	5 EA
Picnic table, 8’	16 EA
Tree	13 EA

Lessons Learned

The driving force of this project was design. As a construction management student, and through internships, I have had sufficient training and exposure to estimating, takeoff, and construction practices, but I have never played the role of the designer. Designing the three projects was the most challenging and technically difficult part of the preconstruction planning. The main takeaway I had from this was the fact that you are never done designing. Every time I thought I had completed a design; I would come back to it and realize there were ways of improving it. Additionally, I needed to create 3D models, renderings, and plan sheets for this project. While I had baseline knowledge of the program needed to complete this task, I spent a lot of time researching how to use the program to present the models in a professional setting.

In addition to the technical lessons learned, I also acquired first-hand experience working with a "client". This was new territory in my construction management education. The most important takeaway from this experience was the fact that things rarely go according to the original plan or schedule. I initially spoke with the administration about building garden beds at the location on campus, but it soon morphed into the full-fledged preconstruction proposal described above. Additionally, I had wanted to complete this project in the span of two months but due to delays with the client and scheduling issue, this project extended to five months. I think that this experience has provided me with a small glimpse into the industry world of working and accommodating clients.

Moving Forward

For this project to be executed, Terra Nova high school will need to select and develop one of the conceptual designs. Depending on their selection they will need to hire an engineer that can create permit ready plans for the concrete stage and shade structure. Additionally, they will need to secure funding. As it stands, the project totals came out much higher than currently feasible for the school. To truly move forward with the project, there will need to be significant design changes or fundraising. Within the next couple of months, I will work with the Leadership class to present this

proposal to the administration and further explain how I developed the project budget. During this meeting I will also clarify some of my key assumptions and present the data in a way that is easier to understand without a previous grasp construction.

In addition to the standard next steps for executing a project, we also discussed ways of involving the student population that could reduce the project budget. For instance, a student mentioned that the Wood Shop teacher is interested in creating a Construction Management elective class. Potentially, the class could utilize this proposal in their curriculum and execute some of the additional work needed to get this project off the ground. Also, we discussed involving the AP Art students to design and execute the new mural.

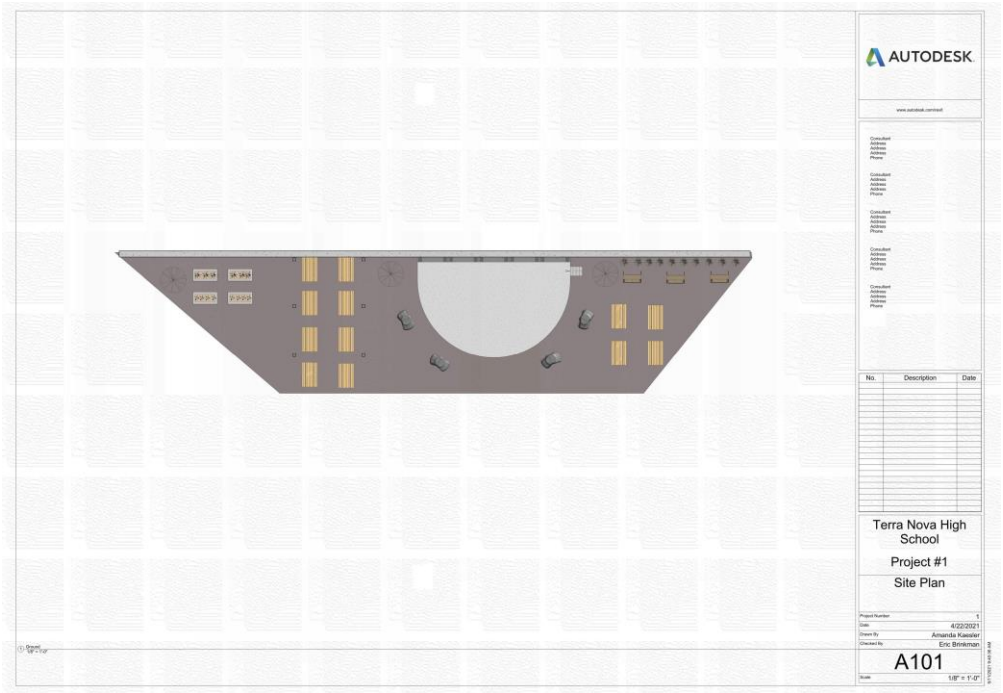

Figure 1. High-cost site layout plan sheet

Figure 2. High-cost proposal renderings

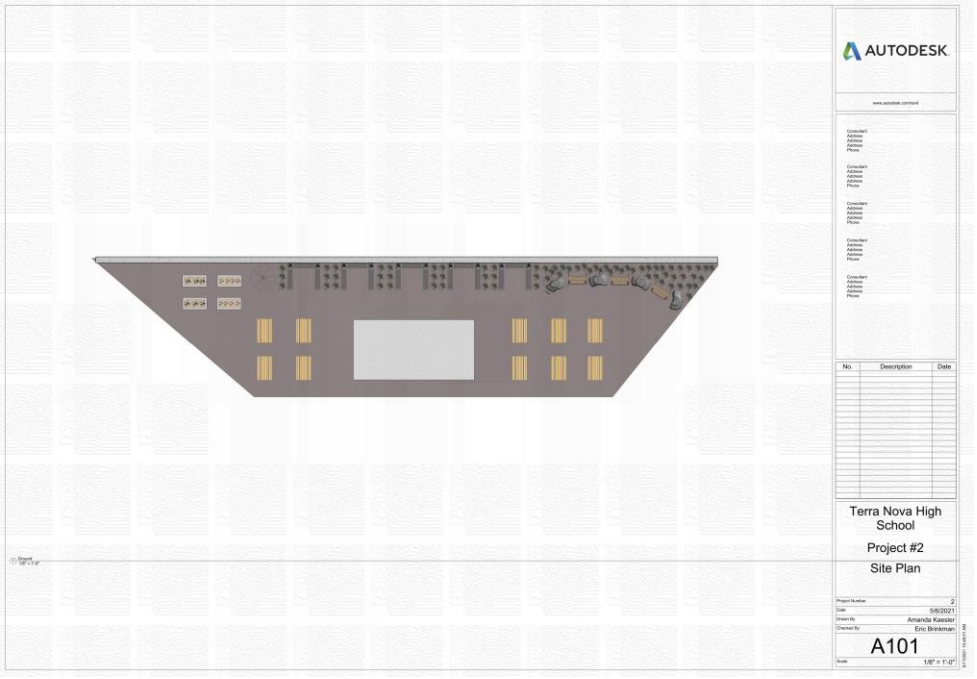

Figure 3. Moderate-cost site layout plan sheet

Figure 4. Moderate-cost renderings

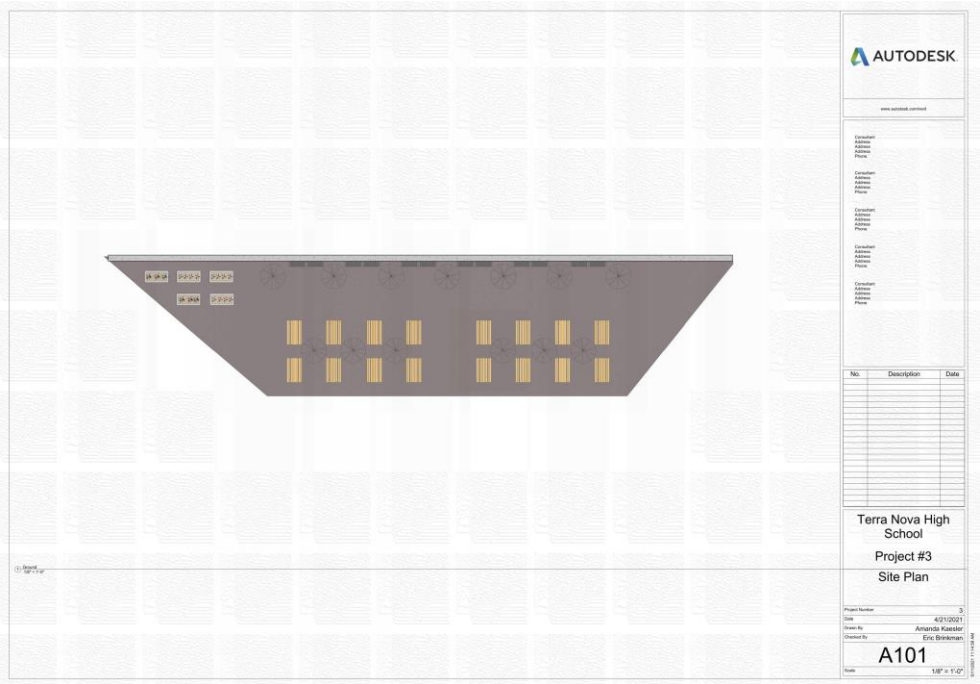

Figure 5. Low-cost site layout plan sheet

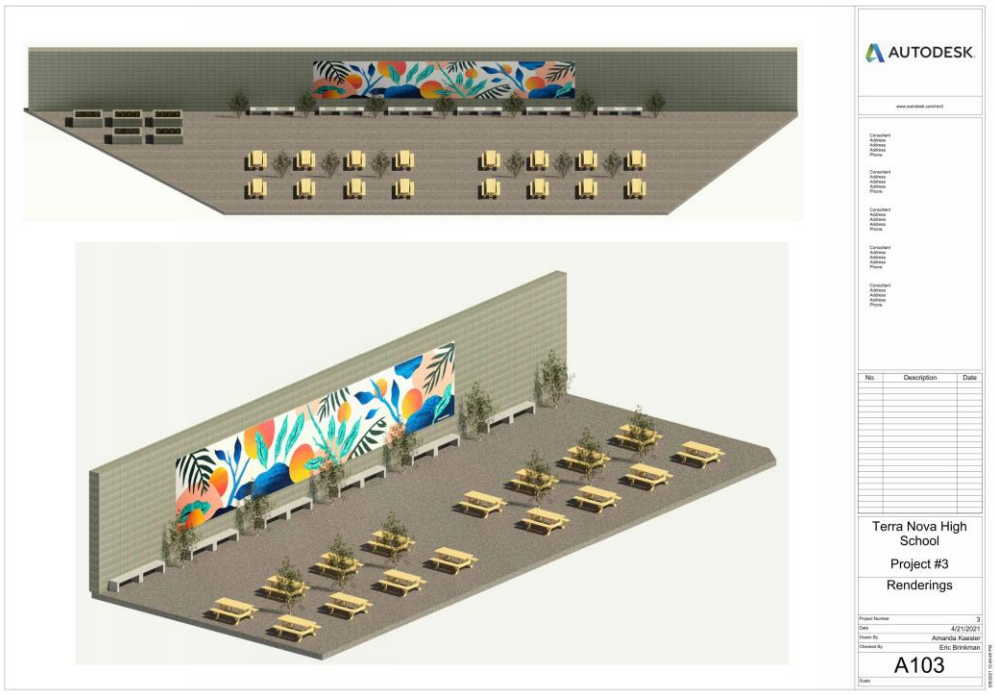

Figure 6. Low-cost proposal renderings

SITE FURNISHING PRICE SHEET

ROBUST CONCRETE PARK BENCH

Price: $588

Distributor: Belson Outdoors
Model TF5027
Dimensions: 72"L x 18"W x 16"H

URL: https://www.belson.com/Backless-Concrete-Park-Benches?utm_source=google&utm_medium=cpc&utm_campaign=SHOPPING%20-%20All&utm_keyword=TF5027&gclid=Cj0KCQjwvY5EBhDjARIsAJMn0IgN9TGBLIOk794mkXhvWBoghgU-tNdluowtwwu8fo_AIuBk_ETie_caAu5VEALw_wcB

8' SUPER SAVER TABLE

Price: $800

Distributor: TreeTopProducts.com
Model - 8' Table SKU 1WG5688

URL: https://www.picnictables.com/supersaver-commercial-rectangular-picnic-tables?sku=1WG5688-BK&st-t=ptgoogshop&gclid=Cj0KCQjwvY5EBhDjARIsAJMn0IhdBjwvOKBd5OYgPXAzXmInc8Q3k_eTyUmoVZNumyfaBUaK0W6_6DMaAkLuEALw_wcB

9-IN-1 MODULAR METAL RAISED GARDEN BED KIT

Price: $250

Distributor: Vego Garden

URL: https://vegogarden.com/products/9-in-1-modular-raised-garden-bed?variant=33018842087459&currency=USD&utm_medium=product_sync&utm_source=google&utm_content=sag_organic&utm_campaign=sag_organic&utm_campaign=gs-2020-09-06&utm_source=google&utm_medium=smart_campaign&gclid=Cj0KCQjwvY5EBhDjARIsAJMn0IjQ_aBYnO7LbQ5eRc4fLxrrqbZx0RVXrDqg46qOTrAeIZGHL2COTcsaApb8EALw_wcB

Figure 7. Sample of the site furnishing price sheet

Terra Nova High School - P1
$$$ Option

PRECISION ESTIMATING SERVICES

SCOPE OF WORK	QTY	UNIT	UNIT PRICE	LINE COST	TOTAL
03 00 00 CONCRETE DIVISION					$22,763
Site Stage					
Structure Foundation					
Continuous, 1'x1' w/ 2' x 8" stemwall	145	LF	$25.00	$3,625	
Slab-On-Grade					
Prep and placement of 6" concrete slab on grade with #3 rebar e.w.	1,367	SF	$14.00	$19,138	
Stage consists of a footing and stemwall with sand backfill and 6" slab on grade					
Assumed #3 rebar throughout					
32 30 00 SITE IMPROVEMENTS					$74,900
Site Furnishing					
Backless concrete bench, 6'	8	EA	$1,000.00	$8,000	
Picnic table, 8'	12	EA	$1,100.00	$13,200	
Swing benches	3	EA	$1,600.00	$4,800	
Concrete pile and anchor at benches and tables	23	EA	$500.00	$11,500	
Modular garden bed, 4'x8'	4	EA	$1,200.00	$4,800	
Site Structure					
Shade sail structure	1	EA	$28,000.00	$28,000	
Site Art					
Mural	1	LS	$4,600.00	$4,600	
Exluded prep of existing DG surface					
Shade sail includes metal post and footing installation					
Mural commissioning excluded, materials only					
32 90 00 PLANTING					$8,360
Tree planting					
Trees, 5 gal	3	EA	$800.00	$2,400	
Drought Tolerant Plantings					
Shrub, native grasses	10	EA	$76.00	$760	
Landscape Accessories & Maintenance					
Site boulders, 3'x3'x3', ~ 2 tons (sized assumed)	8	TON	$650.00	$5,200	
Tree planting includes tree pit prep					
Irrigation excluded, assumed all plantings would be native & drought tolerant					
TOTAL DIRECT COSTS					**$106,023**

Figure 8. Sample of the estimate template